

[illegible]

3

Sy

MT

MT

MT

MT
MT

MT
MT

MT
MT

MT
MT

MT

MT

MT

MT

MT

MT
MT

MT
MT

MT
MTMT
MT

MT

MT

MT

MI

MT
MT

MT
MTMT
MT

MT

M1
M2

W1
W1
W1

41
 42

M1

1

1

1

1

1

—

```
MM      MM      TTTTTTTTTT  HH      HH      CCCCCCCC  EEEEEEEEEEE  XX      XX  PPPPPPPP
MM      MM      TTTTTTTTTT  HH      HH      CCCCCCCC  EEEEEEEEEEE  XX      XX  PPPPPPPP
MMM     MMM     TT          HH      HH      CC          EE          XX      XX  PP          PP
MMM     MMM     TT          HH      HH      CC          EE          XX      XX  PP          PP
MM      MM      TT          HH      HH      CC          EE          XX      XX  PP          PP
MM      MM      TT          HH      HH      CC          EE          XX      XX  PP          PP
MM      MM      TT          HH      HH      CC          EE          XX      XX  PP          PP
MM      MM      TT          HH      HH      CC          EE          XX      XX  PP          PP
MM      MM      TT          HH      HH      CC          EE          XX      XX  PP          PP
MM      MM      TT          HH      HH      CC          EE          XX      XX  PP          PP
MM      MM      TT          HH      HH      CCCCCCCC  EEEEEEEEEEE  XX      XX  PP          PP
MM      MM      TT          HH      HH      CCCCCCCC  EEEEEEEEEEE  XX      XX  PP          PP
```

```
LL      IIIIIII  SSSSSSSSS
LL      IIIIIII  SSSSSSSSS
LL      II       SS
LL      II       SS
LL      II       SS
LL      II       SS
LL      II       SSSSSSS
LL      II       SSSSSSS
LL      II       SS
LL      II       SS
LL      II       SS
LL      II       SS
LLLLLLLLLLLL  IIIIIII  SSSSSSSSS
LLLLLLLLLLLL  IIIIIII  SSSSSSSSS
```

(2)	49	HISTORY	; Detailed Current Edit History
(3)	58	DECLARATIONS	
(4)	86	MTH\$CEXP	- perform COMPLEX exponentiation

MTH
Sym
ARG
MTH
MTH
MTH
REA
ZER

PSE

MT

Pha

Ini
Com
Pas
Sym
Pas
Sym
Pse
Cro
Ass

The
268
The
222
1 p

Mac

_S2

0 G

The

MAC

```
0000 1 .TITLE MTHSCEXP COMPLEX EXPONENTIATION
0000 2 .IDENT /1-002/ ; File: MTHCEXP.MAR
0000 3
0000 4
0000 5 *****
0000 6 *
0000 7 * COPYRIGHT (c) 1978, 1980, 1982, 1984 BY
0000 8 * DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASSACHUSETTS.
0000 9 * ALL RIGHTS RESERVED.
0000 10 *
0000 11 * THIS SOFTWARE IS FURNISHED UNDER A LICENSE AND MAY BE USED AND COPIED
0000 12 * ONLY IN ACCORDANCE WITH THE TERMS OF SUCH LICENSE AND WITH THE
0000 13 * INCLUSION OF THE ABOVE COPYRIGHT NOTICE. THIS SOFTWARE OR ANY OTHER
0000 14 * COPIES THEREOF MAY NOT BE PROVIDED OR OTHERWISE MADE AVAILABLE TO ANY
0000 15 * OTHER PERSON. NO TITLE TO AND OWNERSHIP OF THE SOFTWARE IS HEREBY
0000 16 * TRANSFERRED.
0000 17 *
0000 18 * THE INFORMATION IN THIS SOFTWARE IS SUBJECT TO CHANGE WITHOUT NOTICE
0000 19 * AND SHOULD NOT BE CONSTRUED AS A COMMITMENT BY DIGITAL EQUIPMENT
0000 20 * CORPORATION.
0000 21 *
0000 22 * DIGITAL ASSUMES NO RESPONSIBILITY FOR THE USE OR RELIABILITY OF ITS
0000 23 * SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY DIGITAL.
0000 24 *
0000 25 *
0000 26 *****
0000 27
0000 28
0000 29 FACILITY: MATH LIBRARY
0000 30 ++
0000 31 ABSTRACT:
0000 32 Perform complex exponentiation: e**(r,i)
0000 33
0000 34
0000 35 --
0000 36
0000 37 VERSION: 0
0000 38
0000 39 HISTORY:
0000 40
0000 41 AUTHOR:
0000 42 Jonathan M. Taylor, 19-JUL-77: Version 0
0000 43
0000 44 MODIFIED BY:
0000 45
0000 46
0000 47
```


MTH\$CEXP
1-002

COMPLEX EXPONENTIATION
HISTORY ; Detailed Current Edit History

L 2

16-SEP-1984 01:08:09 VAX/VMS Macro V04-00
6-SEP-1984 11:20:59 [MTHRTL.SRC]MTH\$CEXP.MAR;1

Page 2
(2)

0000 49 .SBTTL HISTORY ; Detailed Current Edit History
0000 50
0000 51
0000 52 : Edit History for Version 0 of MTH\$CEXP
0000 53
0000 54 : 1-001 - Update version number and copyright notice. The last edit
0000 55 : number for version 0 was 4. JBS 16-NOV-78
0000 56 : 1-002 - Add "-" to the PSECT directive. JBS 21-DEC-78

MTH
Tab

```
0000 58      .SBTTL  DECLARATIONS
0000 59
0000 60 :
0000 61 : INCLUDE FILES:
0000 62 :      OERR.MAR
0000 63 :
0000 64 :
0000 65 : EXTERNAL SYMBOLS:
0000 66 :      .GLOBL  MTH$SIN_R4
0000 67 :      .GLOBL  MTH$COS_R4
0000 68 :      .GLOBL  MTH$EXP_R4
0000 69 :
0000 70 :
0000 71 : MACROS:
0000 72 :      NONE
0000 73 :
0000 74 :
0000 75 : PSECT DECLARATIONS:
0000 76 :      .PSECT  _MTH$CODE      PIC, SHR, LONG, EXE, NOWRT
00000000 77 :
0000 78 :
0000 79 : EQUATED SYMBOLS:
00000004 0000 80 :      argadr =      4      ; offset from AP of arg adr
0000 81 :
0000 82 :
0000 83 : OWN STORAGE:
0000 84 :      NONE
```

```
0000 86 .SBTTL MTH$CEXP - perform COMPLEX exponentiation
0000 87
0000 88 :++
0000 89 : FUNCTIONAL DESCRIPTION:
0000 90 :
0000 91 : The result of the operation e ** (r, i) is computed
0000 92 : by:
0000 93 :
0000 94 : result = (EXP(r) * COS(i), EXP(r) * SIN(i))
0000 95 :
0000 96 : CALLING SEQUENCE:
0000 97 : Exponential.wfc.v = MTH$CEXP(arg.rfc.r)
0000 98 :
0000 99 :
0000 100 : INPUT PARAMETERS:
0000 101 : The one input parameter is the address of COMPLEX number (r, i),
0000 102 : where r and i are both single-precision floating point values.
0000 103 :
0000 104 : IMPLICIT INPUTS:
0000 105 : NONE
0000 106 :
0000 107 : OUTPUT PARAMETERS:
0000 108 : NONE
0000 109 :
0000 110 : IMPLICIT OUTPUTS:
0000 111 : NONE
0000 112 :
0000 113 : COMPLETION CODES:
0000 114 : NONE
0000 115 :
0000 116 : SIDE EFFECTS:
0000 117 : Signals: MTH$_SINSIGLOS if |i| > 2*PI*2**31.
0000 118 : Floating Overflow if r > 88.028
0000 119 :
0000 120 :--
0000 121
0000 122
00FC 0000 123 .ENTRY MTH$CEXP, *M<R2,R3,R4,R5,R6,R7>
0002 124 MTH$FLAG_JACKET ; resignal
0002 124
6D 00000000'GF 9E 0002 125 MOVAB G^MTH$$JACKET_HND, (FP)
0009 126 ; set handler address to jacket
0009 126 ; handler
0009 125
50 04 BC D0 0009 126 MOVL @argadr(AP), R0 ; R0 = r
00000000'EF 16 000D 127 JSB MTH$EXP_R4 ; R0 = EXP(r)
55 50 D0 0013 128 MOVL R0, R5 ; R5 = EXP(r)
0016 129
56 04 AC D0 0016 130 MOVL argadr(AP), R6 ; R6 -> (r, i)
001A 131
50 04 A6 D0 001A 132 MOVL 4(R6), R0 ; R0 = i
00000000'EF 16 001E 133 JSB MTH$SIN_R4 ; R0 = SIN(i)
57 50 D0 0024 134 MOVL R0, R7 ; R7 = SIN(i)
0027 135
50 04 A6 D0 0027 136 MOVL 4(R6), R0 ; R0 = i
00000000'EF 16 002B 137 JSB MTH$COS_R4 ; R0 = COS(i)
```

MTHSCEXP
1-002

COMPLEX EXPONENTIATION
MTHSCEXP - perform COMPLEX exponentiatio

B 3

16-SEP-1984 01:08:09
6-SEP-1984 11:20:59

VAX/VMS Macro V04-00
[MTHRTL.SRC]MTHCEXP.MAR;1

Page 5
(4)

51	50	55	44	0031	138				
	55	57	45	0031	139	MULF	R5, R0	:	R0 = COS(i) * EXP(r)
			04	0034	140	MULF3	R7, R5, R1	:	R1 = SIN(i) * EXP(r)
				0038	141	RET			
				0039	142				
				0039	143				
				0039	144	.END			

MTH\$CEXP
Symbol table

COMPLEX EXPONENTIATION

C 3

16-SEP-1984 01:08:09 VAX/VMS Macro V04-00
6-SEP-1984 11:20:59 [MTHRTL.SRC]MTHCEXP.MAR;1

Page 6
(4)

ARGADR = 00000004
MTH\$\$JACKET_HND ***** X 01
MTH\$CEXP 00000000 RG 01
MTH\$COS_R4 ***** G 00
MTH\$EXP_R4 ***** G 00
MTH\$SIN_R4 ***** G 00

+-----+
! Psect synopsis !
+-----+

PSECT name	Allocation	PSECT No.	Attributes
ABS	00000000 (0.)	00 (0.)	NOPIC USR
MTH\$CODE	00000039 (57.)	01 (1.)	PIC USR

CON ABS LCL NOSHR NOEXE NORD NOWRT NOVEC BYTE
CON REL LCL SHR EXE RD NOWRT NOVEC LONG

+-----+
! Performance indicators !
+-----+

Phase	Page faults	CPU Time	Elapsed Time
Initialization	29	00:00:00.10	00:00:00.72
Command processing	133	00:00:00.65	00:00:06.10
Pass 1	78	00:00:00.58	00:00:02.56
Symbol table sort	0	00:00:00.00	00:00:00.00
Pass 2	42	00:00:00.50	00:00:01.93
Symbol table output	2	00:00:00.01	00:00:00.06
Psect synopsis output	2	00:00:00.01	00:00:00.01
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	288	00:00:01.87	00:00:11.39

The working set limit was 900 pages.
2308 bytes (5 pages) of virtual memory were used to buffer the intermediate code.
There were 10 pages of symbol table space allocated to hold 6 non-local and 0 local symbols.
204 source lines were read in Pass 1, producing 11 object records in Pass 2.
1 page of virtual memory was used to define 1 macro.

+-----+
! Macro library statistics !
+-----+

Macro library name	Macros defined
_\$255\$DUA28:[SYSLIB]STARLET.MLB;2	0

0 GETS were required to define 0 macros.

There were no errors, warnings or information messages.

MACRO/ENABLE=SUPPRESSION/DISABLE=(GLOBAL,TRACEBACK)/LIS=LIS\$:MTHCEXP/OBJ=OBJ\$:MTHCEXP MSRC\$:MTHJACKET/UPDATE=(ENH\$:MTHJACKET)+MSRC\$:

0258 AH-BT13A-SE
VAX/VMS V4.0

DIGITAL EQUIPMENT CORPORATION
CONFIDENTIAL AND PROPRIETARY